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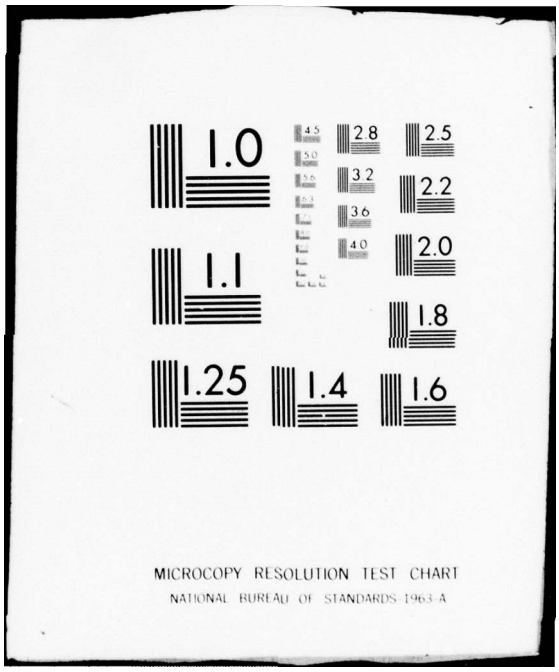
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CHEMISTRY AND BIOCHEMISTRY OF HYDORCARBONS
(SELECTED PORTIONS)



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# EDITED TRANSLATION

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CHEMISTRY AND BIOCHEMISTRY OF HYDROCARBONS
(SELECTED PORTIONS)

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PREPARED BY:

TRANSLATION DIVISION
FOREIGN TECHNOLOGY DIVISION
WP-AFB, OHIO.

Table of Contents

## U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

| Block | Italic | Transliteration | Block | Italic | Transliteration |
|---|---|---|---|---|---|
| А а | *А а* | A, a | Р р | *Р р* | R, r |
| Б б | *Б б* | B, b | С с | *С с* | S, s |
| В в | *В в* | V, v | Т т | *Т т* | T, t |
| Г г | *Г г* | G, g | У у | *У у* | U, u |
| Д д | *Д д* | D, d | Ф ф | *Ф ф* | F, f |
| Е е | *Е е* | Ye, ye; E, e* | Х х | *Х х* | Kh, kh |
| Ж ж | *Ж ж* | Zh, zh | Ц ц | *Ц ц* | Ts, ts |
| З з | *З з* | Z, z | Ч ч | *Ч ч* | Ch, ch |
| И и | *И и* | I, i | Ш ш | *Ш ш* | Sh, sh |
| Й й | *Й й* | Y, y | Щ щ | *Щ щ* | Shch, shch |
| К к | *К к* | K, k | Ъ ъ | *Ъ ъ* | " |
| Л л | *Л л* | L, l | Ы ы | *Ы ы* | Y, y |
| М м | *М м* | M, m | Ь ь | *Ь ь* | ' |
| Н н | *Н н* | N, n | Э э | *Э э* | E, e |
| О о | *О о* | O, o | Ю ю | *Ю ю* | Yu, yu |
| П п | *П п* | P, p | Я я | *Я я* | Ya, ya |

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

## RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

| Russian | English | Russian | English | Russian | English |
|---|---|---|---|---|---|
| sin | sin | sh | sinh | arc sh | $\sinh^{-1}$ |
| cos | cos | ch | cosh | arc ch | $\cosh^{-1}$ |
| tg | tan | th | tanh | arc th | $\tanh^{-1}$ |
| ctg | cot | cth | coth | arc cth | $\coth^{-1}$ |
| sec | sec | sch | sech | arc sch | $\operatorname{sech}^{-1}$ |
| cosec | csc | csch | csch | arc csch | $\operatorname{csch}^{-1}$ |

| Russian | English |
|---|---|
| rot | curl |
| lg | log |

# CHEMISTRY AND BIOCHEMISTRY OF HYDROCARBONS

## MATERIALS OF THE IV ALL-UNION CONFERENCE ON CHEMISTRY AND BIOCHEMISTRY OF HYDROCARBONS OF 25-31 MAY

## TABLE OF CONTENTS

CHEMISTRY OF POLYSACCHARIDES (CELLULOSE EXCLUDED).

CHEMISTRY AND BIOCHEMISTRY OF BIOLOGICALLY ACTIVE POLYSACCHARIDES OF AND ASSORTED BIOPOLYMERS.

154 On structure of ribitteykhoic * acid from actinomycetes - producer of the antibiotic auratine. I.B. Naumova. [Translator note: "Ribitteykhoic" represents transliteration from Russian. Term not positively identified. end note]

157 Glycerine teykhoic acid ["teychoic" is transliteration from Russian] of cell wall of Actinomyces antibioticus st. 39. M.Sh. Zaretskaya, I.B. Naumova, A.Z. Shabarova.

160 Some data on the composition, properties, and biological activity of lipopolysaccharides of actinomycetes and bacillus coli. N.S. Gryaznova.

161 Biologically active polysaccharide complex candida tropicalis. Ye.K. Alimova, A.D. Mar'yasina.

163 Concentration of fucose in the mucus membrane of the stomach and in blood sermum in presence of ulcer.

164 Chemistry of glycoproteins (survey). V.A. Derevitskaya.

171 Synthesis and properties of O-glykosides of β-oxy-α-amino

GLYCOGEN EXCHANGE

229 Intensity of synthesizing glycogen from different glycogen-forming agents during functional shifts in living organism. Z.N. Tupikova, M.I. Prokhorova, V.A. Vilkova, N.D. Yeshchenko.

233 Mechanism by which sugars enter muscle fiber. S.I. Vasyanin, N.A. Vinogradova, N.V. Doroshenko, N.N. Nikol'skiy, L.N. Pisareva, A.S. Troshin.

236 On problem of active center and prosthetic group of PPA of muscles of rabbit. N.D. Dvornikova, M.P. Gulyy, T.T. Volodina, T.N. Pech'nova, N.I. Polikarpova.

240 Activity of hexogenase of normal and denerved skeletal muscles of adult animal and embryo. V.S. Il'yin, V.M. Pleskov, N.I. Razumovskaya.

244 Neurohormonal regulatin of activity of glucokinease and utililization of glucose of fat tissue of epoophoron of rats. K.G. Gromova, I.B. Soliternova.

248 Change in primary structure and properties of aldonase of skeletal muscles during change in physicological state of organism.

M.P. Gulyy, L.T. Litvinenko, N.I. Polydarpova, F.P. Martynenko, N.I. Zhuravskiy, V.A. Kokunin.

251 Mechanisms which regulate glycolase in early embryogenesis. L.S. Mil'man, Yu.G. Yurovitskiy.

253 Role of free radical states in conservation of energy in aerobic oxydation of hydrocarbons. L.M. Raykhman.

257 Study of adenosine glucose diphosphate and its analogs in various ezymatic reactions. T.N. Druzhinina, N.D. Gabrielyan, A.V. Venkina, M.A. Novikova.

260 Effect of nicotine amide on concentration of energy enriched phosphorous compounds in the muscle of the heart under under normal conditions and in the presence of myocarditis. L.A. Tseymlin.

263 comparative characteristics of certain properties of dehydrogenase of 3-phosphoroglycerine aldehyde, derived from various sources. S.Ye. Severin, N.K. Nagradova.

269 Effect of insulin on activity of dehydrogenase of gucose-6-phosphate and 6-phasphorogluconate of the fatty tissue of epoophoron of normal and fasting rats and rats with alloxan diabetes.

HYDROCARBON EXCHANGE IN PATHOLOGICAL STATES

HYDROCARBONS AND HYDROCARBON EXCHANGE IN PLANTS

Biochemistry of Hydrocarbons."

eo

# INTENSITY OF SYNTHESIZING GLYCOGEN FROM VARIOUS GLYCOGEN-FORMING AGENTS WITH FUNCTIONAL SHIFTS IN ANIMAL ORGANISM

Z. N. Tupikova, M. I. Prokhorova, V. A. Vilkova, N. D. Yeshchenko

(Physiological Institute im. A. A. Utomskiy of Leningrad University, Laboratory of Biochemistry of Nervous System and Metabolism)

Presented in the present report are materials on a comparative study of the intensity of synthesizing glycogen in the large hemispheres of the brain for various glycogen-forming agents with functional shifts in the organism of the animal.

The study was performed on white rats weighing 100-200 g.

Serving in the capacity of the glycogen predecessor were glucose-1- $-C^{14}$ lactate - 1-3-$C^{14}$, and acetate - 1-$C^{14}$, which were introduced subcutaneously at a calculated 10-20 μc per 100 g weight. The length of radioactive exposure was from 10 minutes to 2 hours. Caffine and chloralhydrate were administered subcutaneously at 50 mg per 100 g weight, aminazine - 3-4 mg, insulin - 2 units, adrenalin - 1 mg per 100 g weight of the animal.

Glycogen was isolated from the large hemispheres of the brain by the method of Kerr in the Le Baron modification [6]. The concentration of glycogen was determined by the amount of glucose formed after acid hydrolysis.

The radioactivity of the glycogen was determined by calculating the number of pulses in the glycogen residue; the concentration of lactic acid - by the method of Barker and Summerson [5], its radioactivity - in the residue of the zinc lactate. The radioactivity of the glucose was determined in the glucosazone residue. The number of pulses were calculated from the "Volna" device using end counter TBFL-25.

The obtained results were processed statistically. The values of the mean arithmetic (M) with error (±m) are shown in the tables.

It was established that every 5 min after introduction of the radioactive acetate - 1-$C^{14}$ - the specific activity (SA) of the glycogen in the brain constituted a significant value - 106 imp/min/mg. The maximal values of the SA of brain glycogen were found in experiments with 30-60 minutes of exposure. This index decreased somewhat thereafter. It should be mentioned that the curve representing the change in radioactivity of the homogenate in these experiments is more sloping [4]. Comparison of this curve with the curve representing the change in the SA of brain glycogen in time indicates the active entry of the acetate into the glycogen.

The use of marked lactate with a single-hydrocarbon tag (lactate - 1-$C^{14}$) did not make it possible to show a significant amount of it in the brain glycogen [2-4]. Therefore, in the course of further study on the intensity of synthesizing glycogen, we used lactic acid with a solid hydrocarbon tag - lactate - 1-3-$C^{14}$. The studies which were conducted revealed that the maximal SA of brain glycogen in these experiments was found within 60 minutes after the isotope was introduced, when it constituted 121 imp/min/μmole of lactate on the average.

As we see from the results presented in Table 1, glucose is most actively used in glycogen-formation processes in the brain. Within one hour after introduction of the radioactive compound, the SA of

the brain glycogen was more than 60% of the SA of glucose. According to our data acetic and lactic acids also participate rather intensively in the synthesis of glycogen in the large hemispheres of the brain, although the use of these compounds in glycogen formation is approximately three times lower than the use of glucose. Based on published data [1, 7, 8] we assume that the synthesis of glycogen in the brain from lactate and, probably, from acetate as well, occurs not as the result of the reversibility of all glycolysis reactions, rather as a result of the routes taken, which guarantee that energy barriers will be overcome.

The administration of chloralhydrate (Table 2) to animals led to a noticeable drop in the SA of brain glycogen, although under these conditions the SA of the predecessor - radioactive lactate - dropped to the same degree. As a result of this the relative specific activity (RSA) of the glycogen remained virtually unchanged. During excitation, which was caused by an injection of caffine, the SA of the lactate in the brain decreased 5.5 times, glycogen - 2.7 times. Thus, the RSA of the glycogen rose to 43.9%.

The data shown in Table 3 indicate that the SA of the glycogen dropped noticeably as compared to the norm under all effects, while the total activity of the homogenate of the tissue remained almost unchanged (with the exception of experiments where caffine was

introduced, in which case it decreased).

In experiments using glucose-1-6-$C^{14}$ (see the figure) the intensity of glycogen synthesis in the brain in all effects studied by us was lower than for the norm. The most drastic slowing of glycogen-formation was observed in experiments with adrenalin and insulin, which, as we know, greatly disturb hydrocarbon exchange.

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| (1) Радиоактивное вещество | (2) Удельная активность, имп/мин/г ткани | | (5) Включение $C^{14}$(ОУА), % |
|---|---|---|---|
| | (3) гликоген | (4) предшественник | |
| (6) Глюкоза — 1-6-$C^{14}$ . . | 673±51 | 1017±46 | 66,1 |
| (7) Ацетат — 1-$C^{14}$ . . . | 168±17 | 720±22* | 23,3 |
| (8) Лактат — 1-3-$C^{14}$ . . | 658±45 | 3060±98 | 21,5 |

(9) * В опытах с ацетатом-$C^{14}$ за УА предшественника условно принимали радиоактивность гомогената ткани.

Table 1. Intensity of synthesizing glycogen in brain from various radioactive predecessors. KEY: (1) Radioactive substance, (2) Specific activity, imp/min/g of tissue, (3) Glycogen, (4) Predecessor, (5) Introduction of $C^{14}$ (relative specific activity), %, (6) Glucose-1-6-$C^{14}$, (7) Acetate-1-$C^{14}$, (8) Lactate-1-3-$C^{14}$, (9) *In experiments with acetate-$C^{14}$ the radioactivity of the homogenate of the tissue was used conditionally for the specific activity.

| (1) Условия опыта | Удельная активность, имп/мин/г ткани (2) | | (5) $\frac{УА\ гликогена}{УА\ лактата} \times 100$ |
|---|---|---|---|
| | (3) гликоген | (4) лактат | |
| (6) Норма . . . . | 658±45 | 3060±98 | 21,5 |
| (7) Хлоралгидрат | 369±31 | 1990±75 | 18,5 |
| (8) Кофеин . . . | 243±36 | 553±44 | 43,9 |

Table 2. Use of radioactive lactate-1-3-$C^{14}$ for synthesizing glycogen of brain for various functional shifts in animal organisms. KEY: (1) Conditions of experiment, (2) Specific activity, imp/min/g of tissue, (3) Glycogen, (4) Lactate, (5) Specific activity of glycogen/specific activity of lactate, (6) Norm, (7) Chloralhydrate, (8) Caffine.

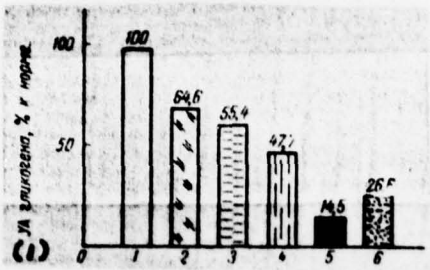


Fig. 1. Use of glucose-1-6-$C^{14}$ for synthesizing glycogen in brain during various functional shifts in animal organisms: 1 - norm, 2 - chloralhydrate, 3 - caffine, 4 - aminazine, 5 - adrenalin, 6 - insulin. KEY: (1) Specific activity of glycogen, % to the norm.

| (1) Условия опыта | Удельная активность, имп/мин/г ткани (2) | | (5) $\frac{\text{УА гликогена}}{\text{УА ацетата}} \times 100$ |
|---|---|---|---|
| | (3) гликоген | (4) ацетат | |
| (6) Норма . . . . | 168±17 | 720±22 | 23,3 |
| (7) Хлоралгидрат | 62±12 | 624±41 | 9,8 |
| (8) Кофеин . . . | 50±14 | 432±35 | 11,5 |
| (9) Инсулин . . . | 26±9 | 708±47 | 3,7 |

Table 3. Use of radioactive acetate-1-$C^{14}$ for synthesizing brain glycogen during various function shifts in animal organism. KEY: (1) Conditions of experiment, (2) Specific activity, imp/min/g of tissue, (3) Glycogen, (4) Acetate, (5) Specific activity of glycogen/specific activity of acetate, (6) Norm, (7) Chloralhydrate, (8) Caffine, (9) Insulin.

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